

Coasts and estuaries: areas with both economic and ecological issues

- Urbanization, harbour, industrial and tourism activities
- Wetlands, corridor for migratory fish, rest area for migratory waterbirds

Areas affected by strong variations of water level

For example in Seine : max tidal range = 8m and twice every day

→ in connection with many forcings: tide, wave, storm surge, streamflow & groundwater



Issue

**To understand the interactions between different water bodies
(river, groundwater, sea)
and their impact on the spatio-temporal variability of water levels**

Proposal in TOSCA program

Characterisation and modeling of the hydrological variability in the coastal zones
in the framework of the SWOT mission

Application to the Seine and Gironde estuaries & coastline of the Up. Normandy

6 teams: M2C Rouen-Caen, LETG Caen, LDO Brest, EPOC Bordeaux,
LEGOS Toulouse, SISYPHE Paris 6 et Mines ParisTech

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Main Objective:

To understand and model the interactions between the different hydro-meteorological factors and different water bodies and their impact on water levels in coastal areas



Comparative study of the hydrological variability of 3 coastal systems

- Seine estuary

Length 160 km, width 150m to 8 km (at the mouth)
max tidal range 8m (at the mouth)

- Gironde estuary

the largest estuary in Europe (635 km²)
length 75 km, width up to 12 km at the mouth

- Upper Normandy coast :

Coastal line 120 km, max tidal range 10m



3 axes (= 3 objectives)

- Study the contribution of different factors in the variability of water level using the signal analysis & processing methods applied to the in-situ measurements
- Modeling the spatio-temporal variability of water levels and factors and SWOT calibration/validation (Comparison models & simulated SWOT data)
- Preparation and calibration of AirSWOT airborne campaign using the analysis of in-situ data and modeling



SWOT interest and conditions for measurements



Interest for SWOT to work on the Seine & Gironde estuaries

Numerous studies & important data base: many gauging stations on the river & tributaries, bathymetric surveys, piezometric data, 10 tide-gauges on the Gironde & 17 tide-gauges & LIDAR survey on the Seine

SWOT interest for the partners working on the Seine and Gironde estuaries

To have spatial information in 2D on the water levels in key sectors (mouth & island areas) and not just at 1 point with 1 tide-gauge

Conditions for carrying out the SWOT measurements

- Ideal: to have measures in all hydrological conditions = 12 cases throughout the year, crossing flow variations of the Seine and tide
 - ➔ Needs : High resolution & Vector data & Simulated daily SWOT data
- spatial resolution depends on the location and width: 150m to 10km
- Preferred measurement period: throughout the year & for AirSWOT in Winter during the highest flows (and floods) and crossing with highest tidal range
- Preferred study areas: all estuaries and coastal zone or key sectors: mouth or island areas

